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13. ABSTRACT (Maximum 200 Words) This presentation reports the results of a comprehensive field validation effort in which measurements from the cone penetrometer deployed LIF sensor are compared directly with results from conventional laboratory-based chemical analyses of samples collected using traditional methods. To minimize spatial and temporal variability associated with sampling, discrete samples were collected immediately after push measurements by overboring the push hole with an auger and collecting soil samples with a split spoon sampler. Secondary fluorescence measurements were made on splits of the laboratory samples to provide direct comparison with laboratory results. All discrete samples were analyzed by EPA Methods 418.1, Total Recoverable Petroleum Hydrocarbons (TRPH) and DHS Method 8015-Modified, TPH. At some sites samples were also analyzed for SVOC, EPA Method 8270, and/or an enhanced 8270 that quantifies 40 individual polynuclear aromatic hydrocarbons (PAHs).				
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Abstract of Oral Presentation to be given at:
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Comparison of *in situ* laser-induced fluorescence (LIF) measurements of petroleum hydrocarbons in soils with conventional laboratory measurements

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The Tri-Service (Army, Navy, Air Force) Site Characterization and Analysis Penetrometer System (SCAPS) program conducted the first demonstration of the use of real-time chemical sensors deployed with a cone penetrometer for delineation of subsurface contaminant plumes. The spectroscopic based sensor uses an optical fiber (up to 100 meters long) to transmit 337 nanometer excitation energy from a pulsed nitrogen laser located at the surface through a sapphire window in the penetrometer probe. Fluorescence induced in aromatic hydrocarbons in the soil that contacts the window is returned to the surface over a second optical fiber where it is spectrally quantified using a photodiode array detector. Over the last several years this first generation nitrogen laser-based LIF sensor and more recently the "tunable" wavelength-based LIF system (operated at 290 nm) have been demonstrated at different sites. However, until recently, there has not been a well orchestrated effort to compare sensor results with conventional laboratory-based chemical measurements.

This presentation reports the results of a comprehensive field validation effort in which measurements from the cone penetrometer deployed LIF sensor are compared directly with results from conventional laboratory-based chemical analyses of samples collected using traditional methods. To minimize spatial and temporal variability associated with sampling, discrete samples were collected immediately after push measurements by overboring the push hole with an auger and collecting soil samples with a split spoon sampler. Secondary fluorescence measurements were made on splits of the laboratory samples to provide direct comparison with laboratory results. All discrete samples were analyzed by EPA Methods 418.1, Total Recoverable Petroleum Hydrocarbons (TRPH) and DHS Method 8015-Modified, Total Petroleum Hydrocarbons (TPH). At some sites samples were also analyzed for Semi-Volatile Organic Compounds (SVOC), EPA Method 8270, and/or an enhanced 8270 that quantifies 40 individual polynuclear aromatic hydrocarbons (PAHs).

Results from ten sites investigated to date (representing different fuel products and different hydrogeological conditions) indicate that the *in situ* sensor data agrees with TPH measurements and TRPH on a detect/non-detect basis approximately 85% of the time. This compares favorably with the agreement (93%) between the two lab methods (TRPH and TPH) on splits of the same samples. Use of qualitative information derived from the spectral signature of the sensor output for discriminating different fuel product types will also be discussed. Finally, results from a demonstration conducted as part of the US. Environmental Protection Agency Consortium for Site Characterization Technology (CSCT) at the Hydrocarbon National Test Site in Pt. Hueneme CA will be presented.

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